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WASTE PROFILING OF NEWLY GENERATED TRANSURANIC WASTE AT TA-55

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ABSTRACT

For many years, segregation of transuranic (TRU) waste at Technical Area 55 (TA-55) was based on the TRU Package Transporter-II (TRUPACT-II) Content Code (TRUCON Code)-dependent matrices, hazardous constituents, the nonhazardous nature of waste, nondestructive assay requirements, and other factors. This approach required well over a hundred active waste profiles for waste acceptance at the onsite treatment storage and disposal facility. Over the past few years, the profiling approach has evolved in an effort to make the waste disposition process more efficient. Based on interpretation of various requirements, TA-55 is further simplifying its waste management operations and plans to eventually have only a few tens of waste profiles to expedite the review and approval of drum data packages. Nondefense, or homogeneous, cemented, or vitrified wastes are excluded from discussion in this paper.

INTRODUCTION

For many years, segregation of transuranic (TRU) waste at Technical Area 55 (TA-55) was based on the TRU Package Transporter-II (TRUPACT-II) Content Code (TRUCON code)[1]-dependent matrices, hazardous constituents, the nonhazardous nature of waste, nondestructive assay (NDA) requirements, and other factors. This approach required well over a hundred active waste profiles for waste acceptance at the onsite treatment storage and disposal facility (TSDF). As the effort to keep track of routine (ongoing production activities) and nonroutine (demolition or change of programmatic requirements) wastes increased, the number of active waste profiles increased even further. Over the past few years, the profiling approach has evolved in an effort to make the waste disposition process more efficient.

One approach is to reduce the number of active waste profiles by simplifying the segregation plans and taking advantage of approved acceptable knowledge (AK) and nondestructive assay (NDA) requirements. The most recent initiative involves grouping various processes into a few common sets of applicable Environmental Protection Agency (EPA) hazardous waste numbers (HWN). Without this approach, the number of active waste profiles would have numbered several hundreds. Based on interpretation of various requirements, waste operations, database changes, and the ultimate goal of complying with Waste Isolation Pilot Plant (WIPP)-approved waste stream designations, TA-55 is further simplifying its waste management operations and plans to eventually have only a few tens of waste profiles to accurately characterize TA-55 TRU waste. Fewer waste profiles are expected to help in expediting the review and approval of drum data packages for shipment of TRU waste to the TSDF, and eventual shipment to WIPP.

Profiling Approach From 1999 through Mid–Year 2003

Since the late 1990s through the middle of 2003, segregation of TRU waste at TA-55 was based on a variety of requirements, such as:

- The Department of Energy's (DOE) nuclear material control and accountability (MC&A) requirements
- The DOE's safeguards and security (S&S) requirements for special nuclear material
- The WIPP Waste Analysis Plan (WAP) requirements as presented in WIPP Requirements Adequacy Matrix, WAP Technical Compliance Matrix [2]
- TRUPACT II Safety Analysis Report for Packaging (SARP), and TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) [3]
- Los Alamos National Laboratory (LANL) Part B permit
- LANL waste acceptance criteria (WAC)

These requirements led to incorporations of many details that became the basis for the TRU waste segregation and packaging operations. These details include:

- The MC&A and S&S requirements generally resulted in the segregation of waste by Material Type (MT) 42, 5X, and 83 (plutonium-242, -239, and -238 as the dominant isotope, respectively).
- Matrix density would typically govern the type of NDA instrument to be used; i.e., gamma- or neutron-based. Therefore, waste items assayed on one type of instrument would be placed in a separate drum. For example, a waste item assayed by a gamma instrument would only be placed in a drum where all other waste items were assayed by a gamma instrument. It would be rare to mix gamma-assayed waste items in a drum where all other items were assayed by a neutron instrument.
- The interpretation of the WIPP WAP, TRAMPAC, LANL Part B Permit, and LANL WAC collectively resulted in segregation based on TRUCON codes, the mixed and nonmixed nature of the waste [i.e., presence of Resource Conservation and Recovery Act (RCRA) constituents above the regulatory threshold], thermal wattage limits, and the presence of other regulated contaminants (e.g., beryllium, polychlorinated biphenyls, asbestos, and tritium). The TRUCON codes related to matrices, such as absorbed organics, graphite, combustibles, glass, leaded rubber gloves, inorganic solids, pyrochemical salts, and mixed combustibles and noncombustibles (i.e., not the RCRA definition of mixed for hazardous waste that is radioactively contaminated).

Additional factors that increased segregation are:

- The segregation of defense program waste from nondefense program waste.
- The DOE's contract with the University of California, which calls for the segregation of routine waste from nonroutine waste. Routine waste is generated from ongoing operations, whereas nonroutine waste is generated from activities such as decontamination, decommissioning, and deinventory of material.

The myriad of segregation requirements caused a large number of drums to be actively managed for a long period until they were filled and closed. The amount of physical handling, data management, and needed effort to continually ensure compliance with the variety of requirements caused process inefficiencies.

Profiling Approach Since August 2003

The approach for profiling has evolved in the recent past to its current state. Some segregation criteria were left intact, while others have been combined or modified. For example, waste items continue to be segregated, based on the material type and the type of NDA used (Figure 1). However, TRUCON code or matrix-dependent segregation has been significantly modified (Table I). The waste items from various TRUCON code matrices are not necessarily segregated. An attempt is made to ensure that all closed drums maintain the same debris characteristics. However, homogeneous waste drums may be generated because of safety or operational complexities. Thus, homogeneous wastes can be discarded in a drum that is predominantly a debris drum. Similarly, RCRA hazardous waste items are segregated from nonhazardous waste; however, it is possible that a nonhazardous waste item may be discarded in a hazardous waste drum in the interest of worker safety and to manage the inventory of the waste items. When hazardous and nonhazardous waste items are commingled in the same drum, the drum is managed as a hazardous waste drum.

Characterization of hazardous and nonhazardous waste is based on the waste stream designation. Based on AK, there are a dozen major waste streams at TA-55. Their differentiation is based on characteristics such as nonhazardous, RCRA metals, RCRA metals and organics, homogeneous, debris, plutonium-238, other than plutonium-238, and decontamination and decommissioning activities. Each hazardous waste stream has a suite of RCRA hazardous waste numbers. It is likely that one or more waste streams may share the same set of hazardous waste numbers. A waste item that falls under one of these waste streams would be assigned the suite of hazardous waste numbers relevant to that waste stream (Table II).

Segregation based on defense or nondefense origin of waste continues. However, routine and nonroutine wastes are no longer segregated.

Results

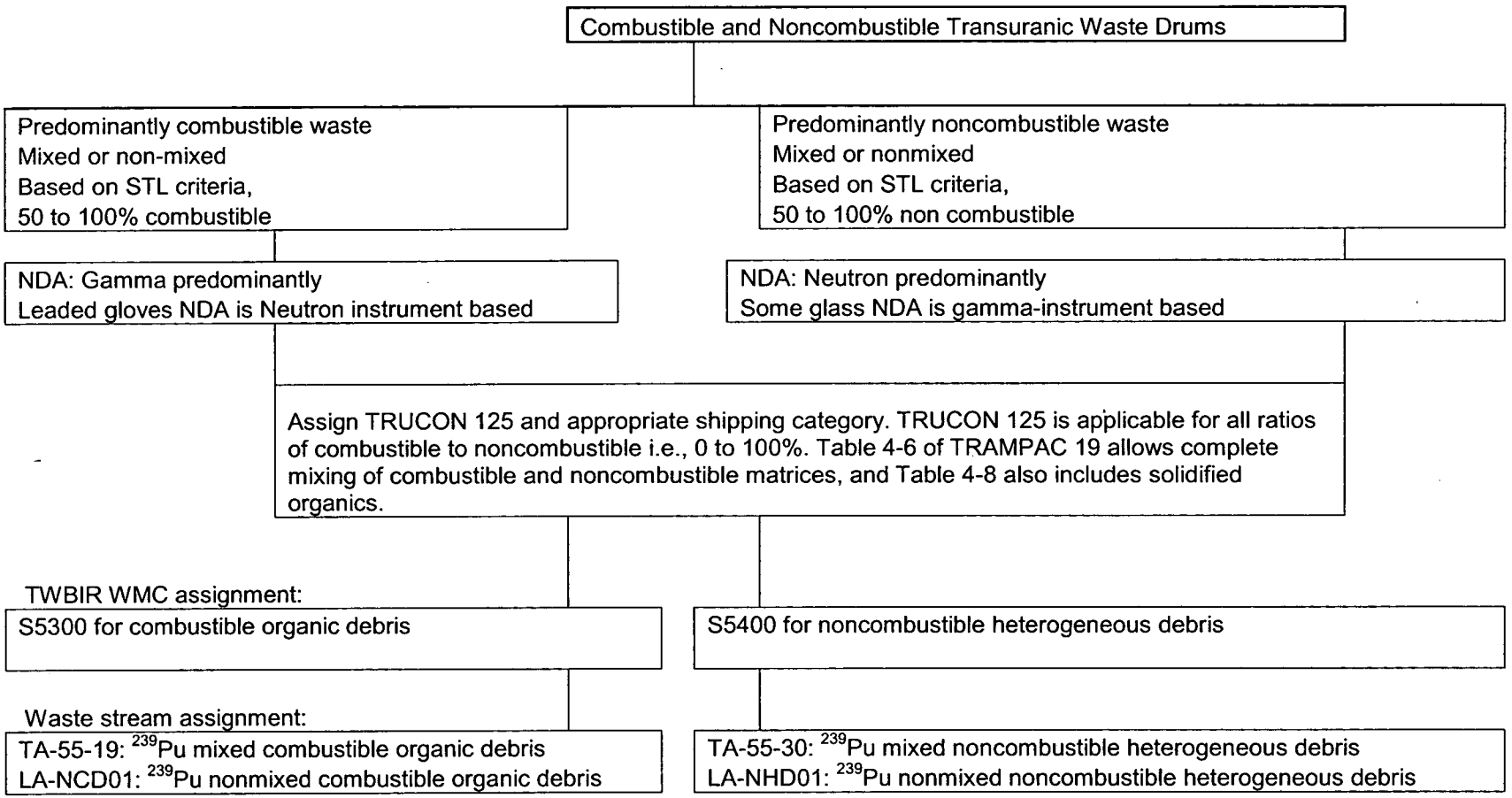
Because of the enhanced segregation approach and consolidation of waste streams, the total number of waste profiles used for onsite TSDF storage has been reduced substantially from well over a hundred in the past. This approach has resulted in filling and closing drums more expeditiously, thus reducing the number of database transactions, physical handling of material, risk of personnel injury, and worker exposure to radiation.

Conclusion

With worker safety and the need to expedite waste drum shipments from TA-55 to the LANL onsite TSDF as two of the most important considerations, waste profiling has taken a new turn. The number of waste profiles used for waste stream characterization has been reduced and the administrative burden of preparing and maintaining hundreds of waste profiles has decreased significantly, while adequate accuracy of characterization has been maintained.

References

1. U.S. Department of Energy (DOE), *TRUPACT-II Content Code (TRUCON)*, DOE/WIPP 89-004, Rev. 11, August 1997.
2. U.S. Department of Energy, WIPP Requirements Adequacy Matrix, WAP Technical Compliance Matrix, Revised by CTAC, March 20, 2002.
3. U.S. Department of Energy, *TRUPACT-II Authorized Methods for Payload Control (TRAMPAC)*, Revision 19, May 2001.



Notes:
NDA = Nondestructive assay
STL = Safeguard termination limit
TWBIR = Transuranic waste baseline inventory report
WMC = TWBIR waste matrix code

Figure 1. Generalized Flow Diagram for the Segregation of Transuranic Debris Waste Stream Assignment

Table I. Transuranic Waste Generation by Payload for Fiscal Year 2003 at TA-55

Program	Category	RCRA	Waste Stream ID	Payload
Defense	Debris combustible	Non-RCRA	LA-NCD01	74
Defense	Debris noncombustible	Non-RCRA	LA-NHD01	5
Defense	Debris combustible	Mixed waste	TA-55-19	97
Defense	Debris noncombustible	Mixed waste	TA-55-30	131
Defense	Homogeneous inorganic, vermiculite	Mixed	LA-MIN02-V	2
Defense	Homogeneous, Salts	Non-RCRA	LA-MIN04-S	26
Defense	Homogeneous, Salts	Mixed	LA-MIN04-S	
Nondefense	Debris, plutonium-238	Non-RCRA	LA-NHD02-238	22
Nondefense	Debris	Mixed	LA-MHD02-238	14

Table II. EPA Hazardous Waste Number Groups and Partial List of TA-55 P/S Code Hazardous Waste Number Assignment

P/S Code	Process Description	PF-4 Area	EPA HWN Group[2]
CR	Crusher Pulverizer	400	A
ELW	Experimental Laserweld	300	A
IX	Ion Exchange	200	B
RC	Rotary Calciner	400	B
RSS	Repackaging Surveillance Study	200	C
This list continues...	...	...	...

EPA HWN Group[2]	Applicable EPA HWNs
A	None
B	D005, D006, D007, D008, D009, D010, D011
C	D004, D005, D006, D007, D008, D009, D010, D011, D018, D019, D021, D022, D035, D038, D039, D040, F001 (trichloroethylene, chlorinated fluorocarbons) F002 (chlorobenzene, methylene chloride, tetrachloethylene, 1,1,2-tricholoro- 1,2,2-trifluoroethane) F003 (methanol, acetone, n-butyl alcohol, xyelene, ethyl ether) F005 (pyridine, toluene, methyl ethyl ketone

NOTES:

1. For waste items assigned to a P/S code not listed in this table, refer to NMT-7-AP-020, *Documenting Acceptable Knowledge for Legacy Waste Items*, for assigning EPA HWNs.
2. Leaded gloves generated by a P/S code listed as EPA HWN Group A defaults to the EPA HWN Group B.